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ABSTRACT

A study was made to determine the effectiveness of the Connecticut "pairing" model in improving the school success of Spanish-dominant children classified as low achievers. The study was concerned with whether a carefully designed model of bilingual-bicultural education can improve reading, arithmetic and language arts skills and enhance the self-concept of Spanish-dominant elementary school children. The pairing model consists of one native Spanish-speaking teacher who teaches basic skills in Spanish and an English-speaking teacher who teaches speaking, reading and writing in English. Study methods, scope and statistical findings are reported in detail. It was concluded that the pairing model does increase the Spanish reading achievement of Spanish-dominant elementary school children at a statistically significant level. The model increased English reading achievement at all grades; the increase was statistically significant at the second grade level. Arithmetic and language arts skills were also improved, in comparison with those of children in typical classrooms. In addition, evidence indicates that the pairing model did enhance the development of a positive self-concept in the Spanish-dominant children, who exhibited less negative behavior than their control group counterparts. It is recommended that the pairing model be introduced into all school districts and that teacher preparation institutions establish appropriate training to produce competent staff for such programs. (CHK)

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A STUDY OF THE EFFECTIVENESS OF THE CONNECTICUT "PAIRING" MODEL OF BILINGUAL-BICULTURAL EDUCATION

conducted by

Alexander J. Plante, Ph.D.

International Bilingual-Bicultural Education Project
of the
Connecticut Staff Development Cooperative

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Hamden, Connecticut

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A STUDY OF THE EFFECTIVENESS OF THE CONNECTICUT "PAIRING MODEL" OF BILINGUAL-BICULTURAL EDUCATION

SECTION I

PROBLEM OF THE STUDY

Introduction

As a part of an International Project in Bilingual-Bicultural Education involving representatives from Sweden, the Netherlands, Connecticut, and New Jersey, a research effort was initiated at the Columbus School in New Haven, Connecticut, to determine the degree to which a program of bilingual-bicultural education would improve the school success of children dominant in a language other than English. In this particular case, the children were Spanish-dominant and were enrolled in an elementary school serving a large percentage of children from low-income families.

There are several studies dealing with the teaching of a foreign or second language. However, little information is available to determine the value of bilingual education in equalizing the educational opportunities of poor children whose native language development is other than English. Because of the need for this type of data, this study was designed to use poor children as its subjects and to test the effectiveness of the "Pairing" Model of Bilingual-Bicultural Education in a city school serving an attendance area with a high concentration of welfare families.

The entire thrust of the International Project as well as this particular study was directed at improving the school success of a special target group of children who typically manifest low achievement and suffer the consequences resulting from the inability of school systems to adjust

to the needs of linguistically or culturally different children.

Concern for the fate of these minority group children who have entered an environment where the majority language or culture differs from their own is at the heart of this study.

Statement of the Problem

The problem of this study was: To study the effectiveness of the Connecticut "Pairing" Model of Bilingual-Bicultural Education (See Appendix A) in improving the school success of Spanish-dominant children who are typically classified as low achievers. More specifically, the study was concerned with the following questions:

1. Can a carefully designed model of bilingual-bicultural education improve the reading skills achievement of Spanish-dominant, elementary school children?
2. Can a carefully designed model of bilingual-bicultural education improve the basic skills (arithmetic and language arts) achievement of Spanish-dominant, elementary school children?
3. Can a carefully designed model of bilingual-bicultural education maintain or improve the self-concept of Spanish-dominant, elementary school children?

Need for the Study

Although a considerable amount of research is available dealing with the teaching or learning of a foreign language, little evidence exists as to the effectiveness of bilingual-bicultural education in improving the achievement of poor children who have a dominance in a minority language or who have immigrated into a majority culture where the difference makes

real school success a rarity. These immigrating children reflect the full spectrum of ills related to low achievement and poor self-image as well as withdrawal from the educational process. Further, these children are usually poor and come from families which manifest the deficits related to lower socio-economic status. Little is expected of these children and their patterns of school failure must be reversed if the goal of equalized educational opportunity for all is to be realized.

For children with a language dominance other than English, a controversy rages as to the appropriateness of bilingual-bicultural education to meet their unique and personal needs. With little or no scientific information available in this special area of bilingual education, this study and others of scientific worth are needed to provide the data required to resolve some of the issues which are central to the growing use of this type of instruction.

Scope of the Study

It was intended that this study be limited to the issue of appropriate education for Spanish-dominant children, who for the most part were poor, and would be enrolled in urban school systems located in sections of the Northeastern region of the United States. Further, that the study subjects would be Spanish-dominant children who become progressively deficient in basic subject achievement as they moved through the elementary grades of our public schools.

This study involved pupils who came from two school attendance areas in one of the poorest sections of the City of New Haven. No attempt was made to vary from this case study approach as it was felt that these particular schools and their pupil populations had the characteristics needed to provide the evidence related to the special problem of this study.

Procedures Employed

Following the creation of the International Bilingual-Bicultural Education Project which was developed to study selected models of bilingual-bicultural education, this specific New Haven research was implemented and completed through the use of the following major steps:

Step I -- To clarify and develop specific instructional principles for a "pairing" model of bilingual-bicultural education which was conceived and being considered as having potential in educating Spanish-dominant children who require much more than the usual school resources available to elementary school children. This step or specific effort created the Connecticut "Pairing" Model of Bilingual-Bicultural Education (See Appendix A for a description).

Step II -- To secure funding for this particular research effort in New Haven. The funding was eventually provided through these individual sources: (1) The Hazen Foundation, (2) The United States Office of Education, and (3) The Hamden-New Haven Cooperative Education Center.

Step III -- To secure permission from the New Haven Board of Education to conduct this study within its school district.

Step IV -- To meet with the principals of schools with high concentrations of Puerto Rican children to determine which New Haven Elementary school was appropriate and would be used for the study. Through this procedure, the Columbus School with a Puerto Rican pupil population of approximately fifty (50) percent, and growing larger, was selected.

Step V -- To secure the staff needed to provide the teaching resources

needed to institute the Connecticut "pairing" model into the school for the 1973-74 school year. An Anglo teacher was selected from the existing staff of the Columbus School to serve as the English-speaking part of the "pair" and a vacancy was set aside for the employment of a native-speaking Puerto Rican teacher to provide the needed Spanish instruction. Up to the time when this study was initiated, no Spanish-speaking teachers were on the staff of the Columbus School.

Step VI -- To administer the Inter-American Test of General Ability (Level I and Level 2) to all Spanish-surnamed children completing the kindergarten and first grade levels at the Cheever and Columbus Schools of the New Haven School System.

Step VII -- To identify through the use of the Inter-American Test of General Ability (Oral Vocabulary Section), the Spanish-dominant children in the kindergarten and first grades so that experimental and control groups could be formed.

Step VIII -- To train the two identified teachers who were to become the "pair" for the implementation of the study activities at the Columbus School. This training was accomplished in a three-week workshop conducted during the summer of 1973.

Step IX -- To introduce the Connecticut "Pairing" Model of Bilingual-Bicultural Education into the curriculum structure of the Columbus School. The experimental group children who received this type of educational instruction were randomly selected Spanish-dominant first and second grade pupils who were tested for dominance during the previous Spring. These experimental children from the Cheever and Columbus

Schools were provided this type of bilingual-bicultural education ("pairing" model) at the Columbus School during a study period of two years (1973-1975).

Step X -- To gather, analyze, and interpret the data received from this two-year study period, so that findings and conclusions concerning bilingual-bicultural education could be derived from the research data.

SECTION II

STUDY METHODOLOGY

Introduction

To gather the data needed to provide credibility for this research, it was deemed necessary to create a study design which would utilize experimental and control groups composed of similar children who were placed in one of these groups through a random procedure. Dealing with human subjects made this procedure a difficult one to implement, but work and communication with the target community to develop an understanding of "why" this was necessary made it possible to achieve. Further, it needs to be recognized that no type of bilingual-bicultural instruction was available at the Cheever or Columbus Schools prior to the implementation of this study. The study procedure to form experimental and control group pupils through the use of a random procedure was accomplished and the integrity of the placement process was maintained throughout the entire two-year study period.

As a result, it was possible to implement a piece of research using two groups of similar children for comparative purposes. Once it was proved that the two groups of pupils were similar, it was possible to provide bilingual-bicultural instruction to the experimental group as the study variable and test for differences at the completion of the 1974-75 school year.

Selection of Pupils

As stated previously, it was decided to conduct the study using the classic research design of experimental and control groups. The target pupils to be identified for each of these groups had to be classified as Spanish-dominant and residing in the Cheever School or Columbus School

attendance areas.

To secure the desired target children, all Spanish-surnamed pupils completing the kindergartens and first grades of the Cheever and Columbus Schools were administered the Inter-American Test of General Ability (Level 1 or Level 2) (Spanish and English forms) as a means of determining language dominance. The Oral Vocabulary sub-tests were used to determine dominance. When a pupil scored higher in Spanish on this particular sub-test he was classified as being Spanish-dominant. If he scored higher in English on this sub-test of the Inter-American, he was classified as being English-dominant.

Through this use of the Inter-American Tests, a total of seventy-six (76) pupils were identified as being Spanish-dominant and eligible for placement in either the experimental or control group of the study. Pupils who were determined to be English-dominant through the Inter-American testing procedure were dropped and no longer considered for the study.

Using a Table of Random Numbers, forty-five (45) pupils were identified for placement in the experimental group and twenty-seven (27) were identified for placement in the control group. The reasons for these particular numbers were as follows:

1. Four (4) Spanish-dominant children had moved by the time the group placement was made.
2. Forty-five (45) children represented about twice the usual class load for teachers at the Columbus School. This was considered essential, as two (2) teachers were required to implement the "pairing" model.
3. Twenty-seven (27) children remained for the creation of the control group. This was felt to be a sufficient number for study purposes.

Once the Spanish-dominant children were placed into experimental and control groups through the use of a random procedure, it became necessary to determine the degree to which the two groups were similar. The analysis used to determine the similarity of the two groups were: (1) sex, (2) test results secured from the Spanish and English forms of the Inter-American Test of General Ability (Oral Vocabulary Sub-Test), and (3) a teacher rating of self-concept. Through an analysis of these measures it was felt a determination could be made as to the similarity of experimental and control group children.

Sex distribution -- In terms of sex distribution, the experimental group identified in the Spring of 1973 consisted of twenty-one (21) boys (47%) and twenty-four (24) girls (53%); whereas, the control group identified at the same time consisted of thirteen (13) boys (48%) and fourteen (14) girls (52%).

At the end of the two-year study period, an analysis of the sex distribution of the reduced number of study children (reduced through movement out of the area) was relatively the same. The experimental group consisted of fourteen (14) boys (45%) and seventeen (17) girls (55%) at the conclusion of the study period in 1975. The control group ended the study period with ten (10) boys (45%) and twelve (12) girls (55%). The sex distribution of the experimental and control groups were almost identical. Thus, it seems proper to state that the loss of five (5) pupils from the control group and fourteen (14) from the experimental group during the study period did not affect their sex distribution.

Achievement in Spanish and English -- Because a central premise of this study dealt with improving the basic skills achievement of Spanish-dominant children, it was essential to insure that the experimental and control groups were similar in terms of Spanish and English achievement

at the beginning of the study period.

In June of 1973, the Inter-American Test of General Ability was administered to the Spanish-dominant children completing the kindergarten or first grades and who were later identified for participation in the study. The kindergarten children were given Level 1 (Spanish and English) and the first grades were given Level 2 (Spanish and English). It was felt that the Oral Vocabulary section of the Inter-American Test of General Ability was the best single indicator of achievement as both the kindergarten and first grade pupils showed little ability to score on the Number sub-tests.

From this pre-study testing, the following pieces of data concerning the degree of similarity of the experimental and control group in terms of language achievement were secured:

1. Experimental group children (N=45) completing the kindergarten and first grades achieved an arithmetic mean of 14.36 raw score points and a standard deviation of 3.85 on the Spanish Oral Vocabulary section of the Inter-American Test of General Ability. Further, these same kindergarten and first grade children achieved an arithmetic mean of 8.70 raw score points and a standard deviation of 4.50 on the English Oral Vocabulary section of the Inter-American Test of General Ability.
2. Control group children (N=27) in the kindergarten and first grade achieved an arithmetic mean of 14.07 raw score points and a standard deviation of 3.83 on the Spanish Oral Vocabulary section of the Inter-American Test of General Ability. In addition, these same control group pupils achieved an arithmetic mean of 10.30 raw score points and a standard deviation of 4.07 on the English form of these same Inter-American Tests.

Using the "One-Tailed, Pooled Variance Formula t-Test" to determine significance, it was found that the differences beween the arithmetic means achieved by the experimental and control groups on the Spanish and English forms of the Oral Vocabulary sections of the Inter-American Test of General Ability were not statistically significant and could be considered chance. Through this procedure, assurance was given that the experimental and control groups were similar in terms of academic achievement related to oral vocabulary as they began the study period.

During the two-year study period (June 1973 to May 1975) the experimental group was reduced from forty-five (45) to thirty-one (31) pupils and the control group from twenty-seven (27) to twenty-two (22). (This reduction was caused by study children moving out of the area.)

To ascertain the degree to which the two groups maintained their characteristics of similarity, which was established at the starting point of the study, an analysis was made of the pre-study test results achieved on the Inter-American Tests by the children remaining in the experimental and control groups of the study.

This analysis at the end of the study period utilizing the test results achieved by the remaining experimental and control group children at the beginning of the study period produced the following information:

1. The loss of fourteen (14) children in the experimental group during the two-year study period resulted in a change of -.46 raw score points in the pre-study arithmetic mean (14.36 to 13.90) of the experimental group in terms of achievement by these children on the Spanish form of the Inter-American Test of General Ability (Oral Vocabulary section). On the English form of these same tests, the loss of the fourteen (14) experimental group children resulted in a change of +.85 raw score points in the arithmetic mean (8.70 to 9.55).

2. The loss of five (5) children in the control group during the two-year study period resulted in a change of +.98 raw score points in the pre-study arithmetic means (14.07 to 15.05) on the Spanish Oral Vocabulary section of the Inter-American Test of General Ability. On the English form, the reduction of five (5) children in the control group caused a change of +.15 raw score points in the arithmetic mean (10.30 to 10.45) when pre-study results from these tests are examined.

In view of the minimal changes in the pre-study arithmetic mean caused by loss of pupils in the experimental and control groups, and the fact that the differences between the arithmetic means of the reduced groups again were found not statistically significant, it is reasonable to state that the children compared at the end of the study had the same quality of similarity which existed at the beginning of the study insofar as Spanish and English language achievement was concerned. If a chance advantage did exist, it favored the control group children on both the Spanish and English tests. The arithmetic means of the control group were larger than those of the experimental group.

Again, it seems important to state that the numerical or arithmetic skills of the experimental and control groups were not analyzed as this particular phase of achievement could not be measured in the kindergarten children and was found to be minimal for those Spanish-dominant children enrolled in the first grade.

Self-concept -- A major purpose of the study dealt with the degree to which bilingual-bicultural education affected the self-image of Spanish-dominant, elementary school children. To determine the similarity between the experimental and control group children, their teachers, prior to the study, rated each child using the "Inferred Self-Concept Scale." Through

the use of this 1 to 5 weighted scale, with 5 being the highest score and 1 being the lowest score, it was found that the experimental group (N=31) achieved a pre-study weighted score arithmetic mean of 3.9; whereas, the control group (N=22) achieved a pre-study weighted score arithmetic mean of 4.0. (It should be noted that these pre-study means on the "Inferred Self-Concept Scale" were secured from the ratings of the reduced experimental and control group children remaining at the conclusion of the two-year study period.)

Comparative Analysis Procedures Used to Answer the Questions Presented by the Study

With evidence to support the fact that the experimental and control group children were similar when they were analyzed in terms of information gathered prior to the beginning of the study period, it was possible to use a post-study measurement procedure to determine the differences caused by the introduction of the study variable -- bilingual-bicultural education into the Columbus School for experimental group children. It seems worthwhile to state at this point of the report that the pupils at the Cheever School who were identified as being Spanish-dominant and selected by a random procedure for placement in the experimental group were transferred to the Columbus School for bilingual-bicultural instruction. (The Cheever and Columbus Schools are located within one city block of each other in the Fairhaven Section of New Haven.)

At the end of the two-year study period, the experimental and control group children (if not retained) had now completed the second or third grades. The children pre-tested as kindergarten pupils completed the first and second grades during the study; whereas, those pre-tested as first graders completed the second and third grades (again, this statement is

correct unless the child was retained).

To be sure that the educational variable introduced by the study is clearly identified, let it be stated once again that the experimental group received two years of bilingual-bicultural education while the control group children received the normal instruction provided by a typical classroom at the Cheever or Columbus Schools supported by tutorial or compensatory help.

To secure information needed to answer the questions presented by this study, specific data gathering procedures were initiated at the end of the study period (May of 1975). These data gathering procedures in terms of study questions were:

Question #1 -- Can a carefully designed model of bilingual-bicultural education improve the reading skills achievement of Spanish-dominant, elementary school children? -- To answer this question, the study children were given the Inter-American Test of Reading (Level 2) (Spanish and English forms). In addition, the study children were administered the Metropolitan Achievement Tests (Primary II Form for the second grade children and the Elementary Form for the third grade children). (Grade placement was determined as being the level where they should have been after two years in school.) From the Inter-American Tests, measures of English reading skills as well as Spanish reading skills were secured for study analysis. Further, through the use of the Metropolitan Achievement Tests it was possible to secure reading achievement grade equivalents for both the experimental and control groups which could be used for comparisons between the study pupils. In addition, the Metropolitan Achievement Tests provided normative achievement data related to these particular tests which made other comparisons with other children a possibility.

For analysis purposes, the mean differences between the experimental

and control groups on the Inter-American Tests were examined for statistical significance through the use of the "One-Tailed, Pooled (Homogeneous) or Separate (Non-Homogeneous) Variance Formula t-Tests." Tests of statistical significance were not used on the Metropolitan tests as grade equivalents are derived scores and this type of analysis did not seem appropriate.

Question #2 -- Can a carefully designed model of bilingual-bicultural education improve the basic skills (arithmetic and language arts) achievement of Spanish-dominant, elementary school children? -- It was felt that the Metropolitan Achievement Tests in spite of their language and cultural bias were the best devices available to measure this type of achievement on the part of the study children. Further, it was recognized that the use of the Metropolitan Tests would give added credibility to the study as the experimental children were taught their basic skills in Spanish and the control group children were taught their basic skills in English. Because the Metropolitan Achievement Tests were created and normed for English-speaking children, it might be expected that the control group pupils would do better on this particular measuring instrument or test.

Through the use of the Metropolitan Achievement Tests, grade equivalent scores in arithmetic and language arts were made available so that the experimental and control groups could be compared for these two types of basic skills achievement.

Question #3 -- Can a carefully designed model of bilingual-bicultural education maintain or improve the self-image of Spanish-dominant, elementary school children? -- To answer this question, teachers having either control or experimental children in their classes at the end of the two-year study period (May 1975) completed the "Inferred Self-Concept Scale" and arithmetic means of the weighted scores for the two groups were developed

for comparative purposes.

In addition to the use of teacher ratings through the use of the "Inferred Self-Concept Scale," a behavioral checklist was created so that observations could be made of experimental and control group children on a scientific basis. Through these scheduled observations, positive and negative behavior patterns of the children could be quantified for analysis purposes. It was assumed that the manifestations of positive behavior would reflect a positive self-concept; and conversely, negative behavior would reflect a poor self-concept.

All children in the experimental and control groups were observed by two outside persons trained for this particular task. Each child in the study was observed for three (3), forty-five (45) minute periods. The two (2) trained observers rotated the children they observed so that additional objectivity could be brought to the process.

Once the observations were completed, they were quantified and percentages were computed based on the number of times a particular behavior was observed so that analysis between the experimental and control group children could be made.

Other facts -- Finally, two additional study procedures need to be mentioned in this particular section of the report dealing with methodology. They were:

1. The study provides information concerning the promotion and non-promotion statistics of the experimental and control group children at the end of one year of the study period. Statistics for the second year were not available when the study ended in May of 1975.
2. For the most part, the study employed the use of outside test administrators. When outside testers were not available and

personnel involved in the study participated in the testing process, two persons were present to insure the credibility of the results secured.

SECTION III

PRESENTATION OF DATA RELATED TO THE EFFECTIVENESS OF THE "PAIRING" MODEL OF BILINGUAL-BICULTURAL EDUCATION

Introduction

In this section of the report, data are presented which relate to the effectiveness of the "Pairing" Model of Bilingual-Bicultural Education as it was implemented in the Columbus School of New Haven, Connecticut during the two-year period of the study (1973-1975). The data gathered for the purposes of this study can be classified into the following general categories of: (1) data related to reading skills, (2) data related to arithmetic and language arts achievement, and (3) data related to self-concept.

To provide for the eventual answering of the questions constructed for the purposes of this study, the information presented will be interpreted through analysis followed by findings which can be supported by the data. In a subsequent section of this report, conclusions and recommendations which seem to be a logical extension of the study findings will be stated.

Data related to reading skills achievement -- The relative reading achievement of the experimental and control groups is shown by Tables 1 and 2. Table 1 provides data related to the Spanish reading skills of the experimental group children who received bilingual-bicultural education and the control group children who were given the usual instruction supported by compensatory education which is provided by the typical "mainstream" elementary classroom of the New Haven School System. English reading skills achievement of the experimental and control group children of the study is shown by Table 2.

TABLE 1

A COMPARISON OF THE RAW SCORE ARITHMETIC MEANS
ACHIEVED BY
EXPERIMENTAL AND CONTROL GROUP SPANISH-DOMINANT PUPILS
ON THE
SPANISH FORM OF THE INTER-AMERICAN READING TESTS (LEVEL 2)

Grade	Control Group		Experimental Group		Difference in the Means	Value of "t"
	Standard Deviation	Arithmetic Mean	Standard Deviation	Arithmetic Mean		
Grade 2	8.29	23.40 (N=10)	10.31	29.47 (N=15)	+6.07	1.553*
Grade 3	6.58	24.67 (N=12)	13.29	40.81 (N=16)	+16.14	4.217***
Total of Both Grades	7.25	24.09 (N=22)	13.08	35.32 (N=31)	+11.23	3.993***

NS = Not Significant
* = Significant at the .10 level
*** = Significant at the .005 level

TABLE 2

A COMPARISON OF THE RAW SCORE ARITHMETIC MEANS
ACHIEVED BY
EXPERIMENTAL AND CONTROL GROUP SPANISH-DOMINANT PUPILS
ON THE
ENGLISH FORM OF THE INTER-AMERICAN READING TESTS (LEVEL 2)

Grade	Control Group		Experimental Group		Difference in the Means	Value of "t"
	Standard Deviation	Arithmetic Mean	Standard Deviation	Arithmetic Mean		
Grade 2	13.81	23.80 (N=10)	8.16	32.40 (N=15)	+8.60	1.961**
Grade 3	18.37	49.67 (N=12)	14.80	54.13 (N=16)	+4.46	.731 (NS)
Total of Both Grades	20.79	37.91 (N=22)	16.20	43.61 (N=31)	+5.70	1.118 (NS)

NS = Not Significant
** = Significant at the .05 level

From the data presented by Table 1, it is shown that the Spanish reading achievement of the experimental children was much greater than their control group counterparts. When the second grade is analyzed separately, it indicates that the arithmetic mean of the experimental group children is +6.07 raw score points larger than for the second grade control pupils. This difference between the means is statistically significant at the .10 level. Again, the higher level of achievement in Spanish reading was found in the experimental group when means are analyzed for third grade pupils and the total of both grades. Table 1 shows that the arithmetic mean of the third grade experimental group was +16.14 raw score points higher than the control group and the mean difference of +11.23 in favor of the experimental group was found when both grades were analyzed together. These differences favoring the experimental group were statistically significant at the .005 level for both the third grade and total groups.

Another interesting fact presented by Table 1 shows that the level of Spanish reading achievement of second and third grade control group pupils was almost the same (arithmetic means of 23.40 and 24.67, respectively). However, this same Table 1 indicates that the experimental group differences in Spanish reading achievement means were quite different between the second and third grade levels (29.47 and 40.81). This was an expected difference as the experimental group children were provided Spanish reading instruction and the control group pupils were taught only in English.

To show the relative achievement of the experimental and control group children in English reading skills, the data on Table 2 are presented. First, it seems significant to point out that the experimental group pupils in the second grade and third grade, as well as when a total group analysis is made, exceeded the English reading achievement of the control group as

this skill is measured by the Inter-American Reading Test. At the second grade level the experimental group raw score mean was +8.60 points larger than that of the control group; at the third grade level it was +4.66 larger; and for the two grades combined it was +5.70 points larger. However, only at the second grade level was this higher achievement in English reading achievement on the part of the experimental group statistically significant. The difference of +8.60 in the raw score means favoring the second grade experimental group over the second grade control group is significant at the .05 level.

To provide additional information dealing with the relative achievement of the experimental and control groups in English reading achievement, the test results secured from the Metropolitan Achievement Tests are shown by Table 3 and Table 4. Table 3 provides data dealing with the achievement of second grade experimental and control group pupils in English reading and Table 4 provides the same type of data for grade three children.

Beginning with Table 3 dealing with second grade pupils, the data indicate that the experimental pupils at this level did better in terms of "total reading" scores. A comparison of the grade equivalent means for the total English reading score shows that the experimental group achieved four (4) months more in terms of its average grade equivalent (2.3 to 1.9). These data show that neither the experimental nor control groups achieved at grade level in "total reading." The experimental group mean was six (6) months behind and the control group was one (1) year behind. (To be at grade level, these groups would need to achieve a grade equivalent of 2.9.)

An analysis of the English reading sub-test scores given by Table 3 shows that the control group pupils did better in "word analysis" and "reading" than the experimental group children. These differences between

TABLE 3

A COMPARISON OF THE MEAN GRADE EQUIVALENTS
ACHIEVED BY
GRADE TWO EXPERIMENTAL AND CONTROL GROUP SPANISH-DOMINANT PUPILS
ON THE
METROPOLITAN ACHIEVEMENT TESTS (FORM PRIMARY II)

Group	Reading				Mathematics			
	Word Knowledge	Word Analysis	Reading	Total Reading	Math Computation	Math Concepts	Math Problems	Total Math
Experimental (N=16)	2.5	1.6	1.8	2.3	2.6	2.1	2.8	2.4
Control (N=10)	1.9	1.8	2.0	1.9	2.0	1.6	1.8	1.7
Difference Between Groups	+0.6 (Exp)	+0.2 (Control)	+0.2 (Control)	+0.4 (Exp)	+0.6 (Exp)	+0.5 (Exp)	+1.0 (Exp)	+0.7 (Exp)

TABLE 4

A COMPARISON OF THE MEAN GRADE EQUIVALENTS
ACHIEVED BY
GRADE THREE EXPERIMENTAL AND CONTROL GROUP SPANISH-DOMINANT PUPILS
ON THE
METROPOLITAN ACHIEVEMENT TESTS (FORM ELEMENTARY)

Group	Reading			Language	Mathematics			
	Word Knowledge	Reading	Total Reading		Math Computation	Math Concepts	Math Problems	Total Math
Experimental (N=14)	3.2	2.8	3.0	5.1	3.9	3.8	4.6	4.0
Control (N=12)	2.7	2.4	2.5	2.4	3.2	3.0	2.5	2.9
Difference Between Groups	+0.5 (Exp)	+0.4 (Exp)	+0.5 (Exp)	+2.7 (Exp)	+0.7 (Exp)	+0.8 (Exp)	+2.1 (Exp)	+1.1 (Exp)

the means favoring the control group was two (2) months in terms of grade equivalents on both tests. The experimental group did six (6) months better than the control group in terms of a grade equivalent mean for the "word knowledge" sub-test.

Table 4 indicates that in terms of total English reading and all the English sub-tests related to reading on the Metropolitan Achievement Tests, the grade three experimental group achieved at a higher level. The experimental group grade equivalent means were five (5) months higher in terms of "total reading," four (4) months higher on the "reading" sub-test, and five (5) months higher on the "word knowledge" sub-test.

As with grade two, Table 4 shows that both the experimental and control, grade three children were behind grade level in English reading. Also, Table 4 shows that the grade three experimental pupils on an average were nine (9) months behind grade level in total English reading and the control group scores were one (1) year and four (4) months behind. (A grade equivalent mean in total English reading of 3.0 years is shown for the experimental group and 2.5 years for the control group.)

Data related to basic skills achievement (arithmetic and language arts -- The data presented by Tables 3 and 4 which report scores achieved by experimental and control group pupils on the Metropolitan Achievement Tests provide evidence related to basic skills progress. An examination of these tables indicates that the experimental group achieved at much higher levels in language arts and arithmetic than its control group counterparts.

Table 3 shows that the grade two experimental pupils achieved a mean grade equivalent in "total mathematics" of 2.4; whereas, the control group scored at a grade equivalent of 1.7 years. The difference between these means in "total math" favors the experimental group pupils by seven (7)

months. This greater achievement in mathematics on the part of the experimental group is apparent on each sub-test. One (1) year higher in "math problems," five (5) months higher in "math concepts," and six (6) months higher in "math computations" represent the grade equivalent differences in favor of the experimental group in the area of mathematics basic skills achievement.

Again, the data on Table 4 show that the experimental children in grade three achieved at higher levels in "mathematics" and "language." This favoring of the experimental pupils held true on all mathematics sub-tests. (There were no language sub-tests.)

First, an examination of the "total math" and "language" grade equivalent scores achieved by the third grade experimental group indicates that they were about or above grade level (3.9) in these areas (4.0 years in "total math" and 5.1 in "language"). The reverse is true of the control group children as they scored with grade equivalents which were behind grade level (3.9) (math and language, 2.9 and 2.4, respectively). In these basic skills areas, it is obvious that the achievement of the experimental group children far exceeded the levels of achievement attained by the control group children.

On all mathematics sub-tests, the experimental pupils achieved higher grade equivalents than the control pupils. In "math problems," it was a +2.1 grade equivalent difference favoring the experimental group, in "math concepts" it was +0.8 years and for "math computation" it was +0.7 years.

From the data presented by Table 4, it seems necessary to emphasize two additional points: (1) the experimental group was about or above grade level in terms of their mathematics achievement on all mathematics sub-tests, and (2) the experimental group was 1 year and 2 months ahead of grade level in language arts. These high levels of achievement on the

part of grade three experimental group children were measured by the Metropolitan Achievement Tests which are in English and prepared for English-speaking children.

Data related to self-concept -- From the data presented by Tables 5, 6, and 7, it can be seen that when comparisons are made, the experimental group developed better than the control group on most items dealing with self-concept. Table 5 gives data related to teacher ratings of study children through the use of the "Inferred Self-Concept Scale"[1] and Tables 6 and 7 present data secured from behavioral observations accomplished by outside persons trained for this specific task.

Table 5 shows that on a weighted scale of 1 to 5, with 5 being the highest score and 1 being the lowest score, the experimental group had a higher arithmetic mean than the control group (4.3 to 3.9, respectively). This difference of .4 weighted points indicates that the experimental children developed a better self-concept as this characteristic is measured by teacher ratings.

The data secured from behavioral observations and shown by Tables 6 and 7 present mixed findings when comparisons are made between the experimental and control group children. Table 6 deals with broad categories of behavior which were deemed to be desirable when study procedures were created. It was established by study procedures that a percentage difference of at least five (5) percent between the experimental and control groups was necessary if a specific behavioral pattern was to be reviewed and reported. The following desired behavioral patterns met the conditions of this study procedure:

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[1] "Inferred Self-Concept Scale," E.L. McDaniel, Ph.D., Western Psychological Services, Los Angeles, California.

TABLE 5

A COMPARISON OF THE TEACHER RATINGS OF SELF-CONCEPT
AS PROVIDED BY THE COMPLETION
OF THE
"INFERRED SELF-CONCEPT SCALE"

Group	Arithmetic Mean of the Weighted Scores
Experimental Group (Grades 2 and 3) N=31	4.3
Control Group (Grades 2 and 3) N=22	3.9

Note: The "Inferred Self-Concept Scale" provides a weighted score within the rank of 1.0 to 5.0, with 1.0 being the lowest score and 5.0 being the highest.

TABLE 6
A COMPARISON OF SELECTED DESIRED BEHAVIORS
OBSERVED AT THE END OF THE PROGRAM
FOR THE
EXPERIMENTAL AND CONTROL GROUPS OF THE NEW HAVEN PROJECT

Description of Behavior Considered to be Desirable	Results of Behavioral Observations of the Experimental Group				Results of Behavioral Observations of the Control Group			
	Times Behavior Was Observed	% of Times Behavior Was Observed	Times Behavior Was Not Observed	% of Times Behavior Was Not Observed	Times Behavior Was Observed	% of Times Behavior Was Observed	Times Behavior Was Not Observed	% of Times Behavior Was Not Observed
1. Did the child speak during the observation?	93	100%	0	0%	66	100%	0	0
2. Did the child seem to be able to work independently?	82	88%	11	12%	56	85%	10	15%
3. Did the child seem to be able to follow directions?	81	87%	12	13%	60	91%	6	9%
4. Did the child appear to be learning?	82	88%	11	12%	55	83%	11	17%
5. Did the child actively move around the room for a positive purpose?	70	75%	23	25%	30	45%	36	55%
6. Did the child actively participate in physical activities?	4	4%	89	96%	10	15%	56	85%
7. Did the child actively participate in singing activities?	10	11%	83	89%	1	2%	65	98%
8. Did the child actively participate in dance activities?	1	1%	92	99%	2	3%	64	97%
9. Did the child offer to contribute to the class by his own initiative either through the teacher or other students?	55	59%	38	41%	27	41%	39	59%
	Number of Observations: 93 Number of children observed: 31 Number observed three times: 31				Number of Observations: 66 Number of children observed: 22 Number observed three times: 22			

TABLE 7
A COMPARISON OF SELECTED POSITIVE AND NEGATIVE BEHAVIOR
OBSERVED AT THE END OF THE PROGRAM
FOR THE
EXPERIMENTAL AND CONTROL GROUPS OF THE NEW HAVEN PROJECT

Positive Behavior				
Description Positive Behavior	Experimental Group		Control Group	
	# Times Observed	% Times Behavior Observed	# Times Observed	% Times Behavior Observed
1. Response to teacher.	46	49%	52	79%
2. Response to other students.	89	96%	58	88%
3. Asked question.	64	69%	33	50%
4. Contributed to discussion.	42	45%	28	42%
5. Worked independently after receiving group directions.	72	77%	51	77%
6. Worked independently after individual teacher explanation.	17	18%	27	41%
7. Worked well on group task following directions.	41	44%	31	47%
8. Sought help when he did not understand directions.	18	19%	14	21%
9. Seemed to concentrate on learning tasks.	66	71%	40	61%
10. Seemed to be actively working with other children.	65	70%	37	56%
11. Seemed to know where to get learning materials.	27	29%	26	39%
12. Seemed eager to contribute to class activities.	54	58%	27	41%
13. Smiled.	61	66%	51	77%
14. Helped or showed act of kindness toward a classmate.	6	6%	2	3%

Negative Behavior				
Description of Negative Behavior	Experimental Group		Control Group	
	# Times Observed	% Times Behavior Observed	# Times Observed	% Times Behavior Observed
1. Inappropriate speaking out.	5	5%	14	21%
2. Cried.	3	3%	0	0
3. Unfriendly actions toward adults.	1	1%	1	2%
4. Unfriendly actions toward other students.	20	22%	15	23%
5. Inappropriately quarrelsome or argumentative.	0	0	3	5%
6. Scowled or furrowed brow.	14	15%	8	12%
7. Got into fights.	5	5%	9	14%
8. Seemed afraid.	2	2%	3	5%
9. Destroyed materials or other property.	0	0	0	0
10. Bullied other students.	2	2%	8	12%
11. Provoked hostility.	4	4%	8	12%
12. Withdrew from activity.	9	10%	8	12%
13. Threw equipment, articles or materials.	3	3%	1	2%
14. Felt "picked on."	2	2%	4	6%
15. Frequent absences.	0	0	0	0

Experimental Group	Control Group
# of observations: 93	# of observations: 66
# of children observed: 31	# of children observed: 22
# observed 3 times: 31	# observed 3 times: 22

1. "Did the child actively move around the room for a positive purpose?" (Behavior observed 75% of the time in the experimental group and 45% in the control group.)
2. "Did the child actively participate in physical activities?" (Behavior observed 15% of the time in the control group and 4% in the experimental group.)
3. "Did the child actively participate in singing activities?" (Behavior observed 11% of the time in the experimental group and 2% of the time in the control group.)
4. "Did the child offer to contribute to the class by his own initiative either through the teacher or other students?" (Behavior observed 59% of the time in the experimental group and 41% in the control group.)

From the specific behavioral observations information presented by Table 6, it would appear that the experimental group differed in a positive direction from the control group more often and on two of the more important items.

The behavioral data shown by Table 7 provide mixed indications which relate to the development of self-concept. In terms of positive behavioral patterns and the percent of times they were observed, the control group was favored at a five (5) percent or higher level of difference on the following items:

1. "Response to teacher" (79% to 49%)
6. "Worked independently after individual teacher explanation" (41% to 18%)
11. "Seemed to know where to get learning materials" (39% to 29%)
13. "Smiled" (77% to 66%)

In this same section of Table 7 reporting positive behavior patterns and the percent of time they were observed, the experimental group was

favored at a five (5) percent difference or more on the following items:

2. "Response to other students" (96% to 88%)
3. "Asked question" (69% to 50%)
9. "Seemed to concentrate on learning tasks" (71% to 61%)
10. "Seemed to be actively working with other children" (70% to 56%)
12. "Seemed eager to contribute to class activities" (58% to 41%)

These data show mixed trends in terms of positive behavioral patterns which were observed in the classrooms of the experimental and control group pupils. In view of these mixed findings, it does not seem appropriate to give any attention to the potential of the information on this side of Table 7 to discriminate in any reliable way between the self-concept development of experimental and control children.

On the side of Table 7 reporting the negative behavior observed, it is clear that control group children in the study manifested more negative behavior than their experimental group counterparts. Using the procedure of requiring a five (5) percent level of difference or more before reporting on a behavioral pattern, the experimental pupils were at least five (5) percent below the control group children on the following items:

1. "Inappropriate speaking out" (5% to 21%)
5. "Inappropriately quarrelsome or argumentative" (0% to 5%)
7. "Got into fights" (5% to 14%)
10. "Bullied other students" (2% to 12%)
11. "Provoked hostility" (4% to 12%)

Without exception, the experimental group did not manifest any typical negative behavior at a rate of difference of five (5) percent or more above the level of the control group pupils when scheduled observations were made.

This examination of the data dealing with negative behavior patterns and the number of times they were observed by outside trained persons is the strongest indication developed through this procedure that the experimental group had a better self-concept than the control group children. The results related to positive behavior are somewhat mixed but the percentages created from the negative behavior observations clearly favor the experimental group pupils.

Other data -- The "other" data developed for the study dealt with promotion and non-promotion (retention) statistics. Obviously, it is an advantage in school to keep children together in their age group if they can achieve as much or more without the failure of not being promoted.

An analysis of the promotion statistics of the experimental group after one year of the study period had been completed (June 1974) revealed that only one (1) pupil had been retained. This is a retention percentage of three (3) percent as the experimental group consisted of thirty-one (31) pupils.

For the control group, an examination of promotion statistics in June of 1974 showed that thirteen (13) out of twenty-two (22) pupils had been retained at the end of one year of the study period. These statistics reveal that the control group pupils in a one-year period had a retention percentage of about fifty-nine (59) percent or at a ratio of approximately 20 to 1 when a comparison is made with experimental group children.

Summary of the data related to the effectiveness of the "pairing" model of bilingual-bicultural education -- An examination of data dealing with the relative achievement of the experimental and control group pupils in the areas of reading, language arts, and arithmetic as well as growth in their self-concept supports the following findings:

1. The experimental group of second and third grade children achieved greater growth in Spanish reading as measured by the Inter-American Test of Reading than the control group children. These differences between the experimental and control group children were statistically significant. This statistical significance was maintained when grade two and grade three children were analyzed separately; and when both grades were combined and a total analysis was made. (Table 1)
2. The experimental group of second and third grade children achieved greater growth in English reading as measured by the Inter-American Reading Tests than the control group children. However, only the difference between the grade two children was statistically significant at the .05 level; whereas, the differences between grade three children and the total group were not significant. (Table 2)
3. The experimental group of grade two and grade three children achieved more growth in "total reading" and "total mathematics" as measured by the Metropolitan Achievement Tests. This difference favoring the experimental group children occured on all sub-tests of the Metropolitan Achievement Tests with the exception of two instances (grade two "word analysis" and grade two "reading" sub-tests). (Tables 3 and 4)
4. The grade three experimental group achieved at a higher level on all sub-tests and sub-test totals on the Metropolitan Achievement Tests than the grade three control children. (Table 4)
5. The experimental group achieved a year or more ahead of the control group on the Metropolitan Achievement Tests in grade two "mathematics problems" (1.0 years), grade three "language" (2.7

years), grade three "mathematics problems" (2.1 years), and grade three "total mathematics" (1.1 years). (Tables 3 and 4)

6. The instances of children achieving at grade level or above on the Metropolitan Achievement Tests occurred only in the experimental mental group and not in the control group. The grade three experimental group achieved at grade level (3.9) in "mathematics computation;" at .7 years ahead of grade level on the "mathematics problems" sub-test (4.6); and .1 years ahead in "total mathematics" (4.0).

   Further, the experimental group scored 1.2 years ahead of grade level on the "language" sub-test (5.1). All the results in this finding were secured from an administration of the Metropolitan Achievement Tests in English. Therefore, these results should be reviewed in terms of school achievement in English. (Tables 3 and 4).

7. The promotion statistics showed that thirteen (13) of twenty-two (22) Spanish-dominant children in the control group were retained at the end of one (1) year of the study period. This is an annual retention rate of fifty-nine (59) percent. Only one (1) child was not promoted in the experimental group for a retention percentage of three (3) percent.

8. The experimental group pupils were rated higher by teachers in terms of their self-concept than the control group pupils. (Table 5)

9. The results are mixed when an examination is made of the positive behavioral pattern of the experimental and control group children observed and recorded at the end of the study period. However, these behavioral observations which have implications dealing with self-concept showed that the control group manifested more negative behavior than their experimental group counterparts. By

using a percentage point spread of five (5) percent or more to identify the negative behavioral patterns different enough to report, the experimental group manifested <u>less</u> of the following characteristics:

a. "Inappropriate speaking out".

b. "Inappropriately quarrelsome or argumentative".

c. "Getting into fights".

d. "Bullying other students".

e. "Provoked hostility".

This manifestation of a greater amount of negative behavior on the part of the control group children is shown by Table 7.

SECTION IV

CONCLUSIONS AND RECOMMENDATIONS

The Problem

As stated at the beginning of this technical report, this study was completed to determine the effectiveness of the Connecticut "Pairing" Model (See Appendix A) in improving the school success of Spanish-dominant children who are typically classified as low achievers. More specifically, the study was concerned with the following questions:

1. Can a carefully designed model of bilingual-bicultural education improve the reading skills achievement of Spanish-dominant, elementary school children?
2. Can a carefully designed model of bilingual-bicultural education improve the basic skills (arithmetic and language arts) achievement of Spanish-dominant, elementary school children?
3. Can a carefully designed model of bilingual-bicultural education maintain or improve the self-concept of Spanish-dominant, elementary school children?

Conclusions

From the major findings and the related data secured from this two-year study (1973-75) of randomly selected Spanish-dominant pupils of the Columbus and Cheever Elementary Schools in New Haven, Connecticut, it is possible to state specific conclusions. These conclusions are as follows:

1. It is apparent from the findings of this study that the Connecticut "Pairing" Model of Bilingual-Bicultural Education does increase the Spanish reading achievement of Spanish-dominant elementary school pupils. The children who were provided this type of

bilingual-bicultural education achieved more in Spanish reading than children assigned to typical classrooms. This difference in achievement was at a level of statistical significance.

2. The Connecticut "Pairing" Model of Bilingual-Bicultural Education does increase the achievement level of Spanish-dominant, elementary school pupils in the area of English reading. The children who were provided this type of bilingual-bicultural education achieved higher grade equivalents in English reading on all but two related sub-tests of the Metropolitan Achievement Tests. Further, at the second grade level, this higher achievement in English reading on the part of pupils receiving bilingual-bicultural education was statistically significant.

3. The Connecticut "Pairing" Model of Bilingual-Bicultural Education does increase the basic skills achievement (arithmetic and language arts) of Spanish-dominant, elementary school pupils. On all total tests and sub-tests of the Metropolitan Achievement Tests dealing with arithmetic and language, the children receiving bilingual-bicultural education achieved higher grade equivalents than the pupils who were assigned to typical classrooms.

4. Evidence exists to indicate that the Connecticut "Pairing" Model of Bilingual-Bicultural Education does enhance the development of a positive self-concept on the part of Spanish-dominant, elementary school pupils. Further, this type of bilingual-bicultural education does reduce negative behavioral patterns.

   The data are mixed in this area of self-concept development, but the findings did show that the teachers felt that the children in the bilingual-bicultural program had better self-concepts than their counterparts in typical classrooms. Also, the data

clearly indicate that bilingual-bicultural instruction reduced the level of negative behavior.

The Connecticut "Pairing" Model of Bilingual-Bicultural Education results in higher promotion rates for Spanish-dominant, elementary school children. It was found that the retention rate of Spanish-dominant pupils in the typical elementary school classroom was twenty (20) times higher than that of the children in a bilingual-bicultural program.

Recommendations

On the basis of the findings and conclusions presented by this study, it is recommended:

1. That the Connecticut "Pairing" Model of Bilingual-Bicultural Education be introduced into all school districts so that the school achievement of children dominant in a language other than English can be increased. This improvement in educational achievement can be completed without a large additional appropriation of funds as the Connecticut "Pairing" Model does not require more than the existing levels of staffing to take advantage of its instructional benefits.
2. That teacher preparation institutions establish appropriate training programs at the undergsaduate and graduate levels so that competent professional staff will be available for the implementation of bilingual-bicultural programs developed from the basic premises which were used in establishing the Connecticut "Pairing" Model of Bilingual-Bicultural Education.

APPENDIX A

DESCRIPTION OF THE CONNECTICUT "PAIRING" MODEL FOR BILINGUAL-BICULTURAL EDUCATION

Connecticut has implemented a model of bilingual-bicultural education which is based on the "pairing" principle of creating an instructional team of a teacher whose native language is Spanish and a teacher whose native language is English. This model has been implemented on an experimental basis at the Columbus School in New Haven, Connecticut.

Organization of the Instructional Team -- The instructional team is composed of a native Spanish-speaking teacher and an early childhood-trained Anglo teacher who were employed from local funds by the identified school. These two staff members provide instruction for approximately forty-five (45) Spanish-dominant children. With this model, the two teachers have been provided with instructional space equivalent to two classrooms in the target school.

Organization of the Instructional Program -- The Spanish-dominant group (45 Spanish-dominant children) are taught their basic skills, i.e., reading, writing, arithmetic, social studies,* and science in Spanish. At the same time, the English-speaking Anglo teacher initiates the teaching of English, beginning with an aural-oral approach. When an English oral vocabulary is sufficiently developed in individual children, she initiates instruction in the reading and writing of English. The key premise in this instructional organization is a concept of diagnostic-prescriptive instruction with both Spanish and English resources being available. The Anglo teacher not only has the responsibility of developing skills in the English language, but in concert with the Spanish-speaking teacher, has the primary assignment of art, music, and integrated learning for the children.

* Social studies will emphasize the history and culture of Hispanic people.